





ON THE

CHARACTERS, PROPERTIES, AND USES

OF

*EUCALYPTUS GLOBULUS*

AND OTHER SPECIES OF *EUCALYPTUS*.

A LECTURE

DELIVERED TO THE FELLOWS OF THE ROYAL BOTANIC  
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BY

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The following Lecture is printed as delivered by request of the Council and Fellows of the Royal Botanic Society of London. It is not intended as an exhaustive address, but simply as a general sketch of the subject treated of, and expressed, as far as possible, in non-technical language, so as to adapt it to the general reader.

ON THE  
CHARACTERS, PROPERTIES, AND USES  
OF  
*EUCALYPTUS GLOBULUS*

(THE "BLUE GUM-TREE" OF TASMANIA) AND OTHER SPECIES  
OF *EUCALYPTUS*.

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INTRODUCTION AND HISTORY.—The recent announcement in the daily papers and various journals of the extraordinary influence of plantations of *Eucalyptus globulus* in destroying the malarious character of marshy districts, and thus preventing the fever which is commonly attributed to them, has naturally excited such a great and widely spread interest that my colleagues on the Council of the Royal Botanic Society of London have invited me to deliver a special lecture to the Fellows and their friends, with the view of making generally known what has been stated in reference to this subject, and, at the same time, to give a sketch of the other properties and uses of this plant and of the species of *Eucalyptus* generally.

The discovery of the influence of *Eucalyptus* trees in destroying or improving the pestilential nature of the climate of marshy districts would appear, according to M. Naudin ('Revue Horticole,' 1861, p. 205), to be due to Sir W. Macarthur, of Camden, Sydney, Australia, who, for this purpose, offered, about the year 1860, to forward seeds of the plant for distribution among the colonists of Algeria and other marshy districts of the world. But previously to this period—that is, in 1854 (as mentioned by M. Raveret-Wattel in a report which he published in 1871 in Paris, for *La Société d'Acclimatation*)—M. Ramel had his attention called while in Melbourne by Dr. Ferdinand von Mueller (now Baron Mueller), the Government Botanist for Victoria and the energetic Director of the Botanic Gardens of Melbourne, to this tree; and in 1856 M. Ramel sent some seeds to Paris, and subsequently, in 1857 and 1860, forwarded further supplies. These seeds were distributed throughout southern Europe, northern Africa, and elsewhere, and the tree is now naturalized in

southern Europe and in many parts of Africa, Asia, and America. M. Ramel not only called attention to the great value of the *Eucalyptus globulus* as a forest tree, but also claimed for it the power of destroying the miasmatic influence of marshy districts. It seems clear, therefore, that it is to M. Ramel, rather than to Sir W. Macarthur, that the discovery of this valuable property of *Eucalyptus globulus* properly belongs.

Subsequently to the above dates, several notices appeared bearing testimony to the febrifugal property of the bark and leaves of this plant when administered internally—among others by M. Pepin, Dr. Carlotti, of Corsica, Dr. Lorinser, of Vienna, Professor Gubler, and Dr. Maclean, of Netley; and in 1870 Dr. Gimbert, of Cannes, wrote a memoir entitled ‘*Eucalyptus globulus*: its value in Agriculture, Hygiene, and Medicine;’ and again, in the ‘*Comptes Rendus*’ for October 6th, 1873, he made a further communication narrating the results of his experiments in Algeria in improving the miasmatic climate by plantations of this tree, and also published a paper in the ‘*Archives générale de Médecine*,’ entitled “*Etude des Applications Thérapeutiques de l’Eucalyptus globulus.*” It is these latter communications of M. Gimbert which have been the cause more especially of public attention being at the present time so particularly directed to the uses of this plant.

BOTANY.—It would be incompatible with my object in this lecture to enter minutely into a botanical description of this and other species of *Eucalyptus*; but we refer those who desire such information to Bentham and Mueller’s ‘*Flora Australiensis*,’ and content ourselves here by giving some general botanical details.

The genus *Eucalyptus* belongs to the natural order Myrtaceæ of botanists, the same order to which belong the Myrtle, the Clove-tree, the Pimenta or Allspice, the Cajeput-oil plant, the Pomegranate, and numerous other plants which are well known as ornamental trees or shrubs, or for their timber, or from yielding various valuable medical and economic products. All the *Eucalypti* (of which 135 species are described in the ‘*Flora Australiensis*’), with the exception of a very few and, in some cases, doubtful species, are natives of Australia, where they are commonly known either as “Gum-trees,” from yielding what are generally described as gummy or resinous products, or as “Stringy-bark trees,” from their rough fibrous bark. Various other local names are also applied to the different species by the colonists in Australia, such as “blue,” “red,” and “white” gum, peppermint, turpentine, iron-bark, woolly-butt, &c. All the species



have evergreen leaves, which, like those of certain species of *Acacia* and other trees that are natives of Australia, usually (after the tree has arrived at a few years of age) hang in an oblique or even vertical direction from the branches, and thus give a very peculiar aspect to the forests of Australia by the difference in the light and shade produced by the trees from those of forests generally in other parts of the world. These leaves are commonly studded with internal glands or receptacles of volatile oil, as may be seen by holding them up to the light, when they present a semitransparent dotted appearance. The flowers, which are usually pinkish or white, are frequently very beautiful, so that this character, combined with the beauty and singularity of their foliage, the elegant appearance generally of the species, and the agreeable nature of their odours, renders them favourite objects for culture. The flowers, when of a white colour, much resemble myrtle-blossoms, but are at once distinguished from them by the absence of petals, and by their peculiar calyx, which in the bud state is closed at the top by a little lid, which is thrown off as the flower expands. The fruit, which consists essentially of the hardened somewhat globular or tubular calyx, contains a number of seeds, which, considering the enormous size and height these trees sometimes attain, over 300 feet in altitude and 100 feet in circumference, are extremely minute. Thus, according to Mueller, one ounce of the seed of the Blue Gum-tree (*Eucalyptus globulus*) contains over 10,000 seeds, and a similar weight of another species more than double that number; and thus from one pound of seeds of the *Eucalyptus globulus* nearly 162,000 plants could be raised.

With these general remarks upon the *Eucalypti* we now pass to the more particular description of *Eucalyptus globulus*. Several plants of this species now before us, from our new Economic-house, will afford us good illustrations; one of these has been in the gardens some years, and is more than 15 feet high; and the others have been mostly raised from seeds forwarded to this Society by Dr. Richard Schomburgk from Australia.

The *Eucalyptus globulus*, commonly known as the Blue Gum-tree, is a native of Tasmania, where it is more especially found on the damp slopes of valleys with a southern aspect. The foliage presents in a remarkable degree the changing aspect of the species of *Eucalyptus*. Thus in young plants the leaves are of large size, sessile, placed horizontally on the stem and branches, and of a bluish glaucous-white colour; but on plants varying from three to five years old the leaves become narrower, of a bluish-green colour, somewhat

scimitar-shaped, and hang vertically or somewhat obliquely on the branches, instead of horizontally. The flowers, which are large and axillary, and nearly sessile, grow singly or in clusters of two or three: before they expand, the flower-bud, covered by the lid or operculum of the calyx, has a rounded form; hence its specific name of *globulus*.

GROWTH AND ACCLIMATIZATION.—This tree is so rapid in its growth “that any man in twenty years’ time could find himself, if he chose, surrounded by a forest of his own planting.” It has been further stated recently that in a grove planted only sixteen years, the trees averaged 72 feet in height and 6 feet in girth. M. Raveret-Wattel says that a *Eucalyptus* tree of “ten years old ordinarily presents the development of a well-grown oak of a century; and it is not rare to meet in Australia with specimens in their fiftieth year from 160 to nearly 200 feet high, and 50 to 60 feet in circumference at the base.”

These statements are also fully confirmed by the growth of the *Eucalyptus* trees in Algeria; and the following extract from a letter received by Mr. Daniel Hanbury from his brother at Mentone, which he has kindly forwarded me, also testifies to the same fact:—“In a good soil with a moderate amount of moisture the growth of the *Eucalyptus globulus* is astonishingly rapid. In the ground of the Palazzo Orango, 4 miles east of Mentone, there is a specimen which was planted in March 1869 (that is, just five years ago), being then a seedling of about 3 feet high. This tree was measured a few days ago, when it was found to be 48 feet high, with a trunk having a circumference of 3 feet at 3 feet above the ground.”

In some cases the Blue Gum-tree has been known to attain the colossal dimensions of 350 feet in height and 100 feet in circumference, rivalling, if not exceeding, in these respects the celebrated Californian Coniferous tree the *Sequoia Wellingtonia* (*Wellingtonia gigantea* of Lindley). There is no question that, with the doubtful exception of this tree, it excels in dimensions any tree in the world: and as it rarely sends out a branch until its trunk is 100 feet high, its value as a timber-tree may be in some degree judged of; for in many cases planks of this wood, which is remarkable for its hardness and durability, have been cut of 160 feet in length, 20 inches broad, and 6 inches in thickness. In 1855, a plank was prepared for the Paris Exposition; but no vessel could be found capable of conveying it to Europe.

A tree of such beauty and utility, independently of its other



important properties and uses to be presently noticed, has naturally excited much interest; and various attempts have been made to introduce it in different parts of the globe thought to be suitable for its growth and development. These attempts have been attended, as already noticed, with considerable success; and it is now more or less successfully cultivated in various parts of Southern Europe—as France, Spain, Portugal, Greece, and Italy; also in Palestine, various uplands of India; in parts of North and South America; at Natal, and other places in South Africa; in Cuba, St. Helena, Egypt, Corsica, and Algeria. It has also been introduced into New Zealand, and is said to grow tolerably well in sheltered situations in the island of Jersey, and also in some parts of South Devon and elsewhere in the south and west of England; but the plants, except under very exceptional circumstances, are not likely to withstand the winter in this country. It has, however, been stated lately in ‘The Times’ that some *Eucalypti* had been grown in the open air at East Grinstead, Sussex, and that they had survived two winters without any protection. Several other instances have also been mentioned of plants having survived the winter in this country; but it is not probable that this species of *Eucalyptus* will ever become naturalized with us. Even in Italy, as it has recently been stated as a proof of the *Eucalyptus* requiring a climate where the temperature is never below the freezing-point, of all the trees planted by the Roman Railway Company along the line from Rome to Naples, only those plants in the neighbourhood of Naples have survived through the winter. It is also said that the tree is so extremely tender when young that, even when sheltered from wind and cold, it cannot resist a temperature lower than 27° Fahr. It would probably succeed admirably in the swampy regions of the west coast of Africa; and as these countries have been now opened out by the indomitable pluck of our brave soldiers, it is hoped that the experiment will be soon made on an extensive scale.

Seed for this purpose could be readily obtained from Australia; indeed the exportation of *Eucalyptus* seeds is already carried on to a large extent from this country. At present but little seed could probably be obtained from trees acclimatized in other parts of the world, although in a few years it will become very plentiful, as the tree begins to yield seed plentifully when about seven years old.

Various circumstances combine to facilitate the transportation of these seeds—as their natural dryness and minuteness; and the seedlings can be raised with great facility and quickness, requiring

but little caro; and within a year or less they may be transplanted. The rapidity of their growth has been already alluded to, and I have also mentioned that Baron Mueller calculated that about 162,000 trees could be raised from 1 lb. of seeds. Even if only the seedlings of one quarter of the seeds of 1 lb. were finally established, they would suffice, says Baron Mueller, to "cover 404 acres of ground, assuming that we planted at the rate of 100 trees to the acre."

The following directions as to the best time and method of sowing the seed and raising the seedlings have been given in the 'Gardeners' Chronicle,' from a correspondent in Buenos Ayres:—

"The best method and time of sowing the seed is under glass, either in a frame or by covering the box over with a piece of glass; and during the months of September and October, after they have attained the height of 3 inches, pot them off into small 2-inch pots. When these have attained considerable strength, either shift them into larger pots or plant them permanently in the ground, which may be done during the months of February or March, according as the rain falls, or they may be left till the following July or August; this is best regulated according to the situation of the land, taking care that they are not exposed to the cold south-west winds when young and tender, or the frost will be likely to kill them.

"The soil most adapted to the raising of these plants is a mixture, of equal parts, of vegetable mould, ordinary soil, rotten manure, and sand. When they are about 3 feet high they are best planted in the ground. First, dig a hole 2 feet deep by 2 feet across the top; put the best soil at the bottom. Let these holes be filled with water, or left open till after a heavy rain. Having put the best soil at the bottom, take the plants, spread out the roots, then put in the remaining soil, leaving a slight hollow so that the rain may penetrate after every shower. When they begin to grow fast, drive in three stakes across each other near the bottom of the stem, in the form of a triangle, placing some hay round the stem, and a piece of wire to secure the stakes round the tree; in this way the trees are quite safe from being blown down, and are not injured by the string being left round them too long."

The above directions have been given in full, but will of course require modifications in different countries and circumstances. Ordinarily in this country *Eucalyptus* seeds are sown in a mixture of loam, peat, and ordinary soil, with a sprinkling of sand on the surface, and are readily raised in a greenhouse.

Having now described, as fully as time will allow, the general and botanical characters of the *Eucalyptus globulus* and other species of *Eucalyptus*, we proceed to refer to their properties and uses, with more especial reference to *Eucalyptus globulus*.

PROPERTIES AND USES.—The first and most important influence which this tree exerts, and that which has brought it more especially into notice, is its power of destroying the malarious agency which is supposed to cause fever in marshy districts; from which circumstance it has been called “the fever-destroying tree.”

It is in this respect commonly regarded as being serviceable in two ways—first, by the far-spreading roots of this gigantic tree acting like a sponge, as it were, and thus pumping up water and draining the ground; and, secondly, by emitting odorous antiseptic emanations from its leaves. Probably the influence of the latter is but small; although I am by no means of the opinion entertained by some writers, that these emanations are without effect. I do not certainly believe, as has been recently stated, that the branches of a solitary *Eucalyptus* tree can have had any effect in neutralizing the malarious influence of a district previously constantly infected by fever; but I do think that the foliage of groves of *Eucalyptus* trees, by diffusing an agreeable, aromatic, camphoraceous, stimulating odour in the surrounding air, does have an appreciable influence in neutralizing marshy miasmas, and thus improving the healthiness of the district. The great influence is, however, in my opinion, unquestionably produced by the power the roots possess of absorbing water from the soil. It is stated that a *Eucalyptus* tree absorbs as much as ten times its weight of water from the soil; and hence the enormous suction-power of masses of such trees may in some degree be judged of; so that, where thickly planted in marshy places, “the subsoil is drained in a little while as though by extensive piping.”

That the main influence of *Eucalyptus* trees is thus due to the absorptive power of the roots is also borne out by the fact that other plants of rapid growth, when planted in marshy districts, have a sensible effect in diminishing their malarious influence. This is notably the case with the Sunflower, which is grown for this purpose to a large extent in the swampy regions of the Punjab and other parts of the world; and the effect has been that districts which were previously remarkable for their insalubrity are now said to be entirely free from miasmatic fever.

But whatever be the cause or causes which render a marshy district thus comparatively healthy to what it was before the intro-



duction of the *Eucalyptus* trees into the neighbourhood, the fact is unquestionable, and is now testified to in various parts of the world. Thus at the Cape, in a very few years, the cultivation of the *Eucalyptus* has completely changed the climatic condition of the unhealthy parts of that colony; and in Algeria, where it has been tried on a large scale in a district previously noted for its pestilential air and consequent prevalence of fever, not a single case now occurs, although the trees are not more than 9 feet high; and in the neighbourhood of Constantia it is also stated that at another noted fever-spot covered with marsh-water both in winter and summer, in five years the whole district was dried up by 14,000 of these trees, and the inhabitants now enjoy excellent health. In Cuba, again, marsh-diseases are fast disappearing from the unhealthy districts where this tree has been introduced. In the Department of the Var it is also said that a station-house situated at one end of a railway viaduct, so pestilential that the officials could not be kept there longer than a year, is now as healthy as any other place on the line, in consequence of the planting of a few *Eucalyptus* trees. Numerous other instances might be cited to the same effect as having occurred in France, Spain, Italy, Germany, and other parts of the world; and we cannot doubt therefore that although the effects have been to some extent probably exaggerated, the statements are substantially correct, and that this tree does possess a most beneficial effect in neutralizing and improving the malarious influence of marshy districts, and that attempts should be therefore made to introduce it into those regions where the climatic influences are favourable for its growth and development. Several of the districts into which it has been so introduced have been already noticed and others suggested, so that it is unnecessary to allude further to it here; but we now proceed to allude briefly, as our time will only allow of this, to the other properties and uses of this tree and of other species of *Eucalyptus*.

In the first place we may state that the timber of many species of *Eucalyptus* is of very great value, and is largely used throughout the Australian colonies. The great length of planks obtained from such trees has been already mentioned; and those of the *Eucalyptus globulus* and other species are most excellent for ship-building. The timber of several species is remarkable for its solidity, hardness, and durability, and from its power of resisting the attacks of insects and the teredo, as also the influence of moisture. Such qualities render it peculiarly valuable for many useful purposes, as, for

instancos, railway-sleepers and maritime works. Various species, which we have not time to refer to, are also applicable to a number of other useful purposes—as shafts for gigs, spokes and felloes of wheels, boards for flooring, material for fencing land, poles of drags, &c.

Among the products obtainable from *Eucalyptus* wood we must not forget that of potash, more “particularly as this alkali can be obtained without sacrifice of any valuable timber, and from localities not accessible to the wood trade.” The richness in potash of this wood may be estimated from the fact that Baron von Mueller found that the ashes of these trees “contained a larger proportion of potash than the Elm or Maple, which are the trees most esteemed for that purpose in America. The yield from the latter trees is estimated at 10 per cent. of the ashes, while that from the *Eucalyptus* is 21 per cent.”

The barks of various species are also now used to some extent in paper-making; those of *E. rostrata*, *E. obliqua*, *E. corymbosa*, and *E. goniocalyx* are amongst those so employed. Several specimens of these papers, which are principally used for packing and printing, and for which I am indebted to the kindness of Mr. P. L. Simmonds, are now on the table. Good writing-paper has also been made from the bark of *E. obliqua*.

The barks of many species are also used extensively for tanning. They owe this property to the presence of similar constituents to those contained in oak-bark and other substances commonly employed in this country and elsewhere for a like purpose.

A number of species of *Eucalyptus* also exude a very astringent substance, which, from its resemblance to the ordinary medicinal kino both in appearance and properties, is commonly designated as *Eucalyptus* or *Botany-Bay Kino*. This substance, which, when it first exudes, trickles like blood down the bark of the trees in a semifluid state, ultimately hardens into dark red shining masses, which have a very astringent taste. It is employed for similar medicinal purposes as our official kino, and also for tanning and dyeing. Various specimens of this kino, derived from *E. resinifera*, *E. globulus*, *E. corymbosa*, *E. rostrata*, and *E. citriodora*, are now exhibited. Another substance, called *Eucalyptus* or *Australian Manna*, is also yielded by *E. mannifera*, *E. viminalis*, and probably other species. Two varieties of this Manna have been distinguished, one of which is now exhibited. This is in small, rounded, opaque, whitish masses, with an agreeable sweet taste. It has a similar action to the ordinary Manna in use in this country, and contains somewhat similar



constituents. It exudes abundantly during the summer months through punctures or wounds made in the leaves and young bark. As it exudes it hardens, and drops from the leaves on to the ground in pieces sometimes as large as an almond.

We may here refer to the fact that the flowers of species of *Eucalyptus* yield a large quantity of honey, and are therefore greatly affected by bees. It is said that Gould "has taken as much as a teaspoonful of honey from the mouth of a bird shot by him whilst it was feeding."

Another very important produce of the *Eucalypti* is the essential oil, which may be obtained in large quantities by aqueous distillation from the leaves. This oil is stored up in the pellucid glands already referred to as contained in the leaves, and readily observed when these are held up to the light by the semitransparent appearance they then exhibit. These oils are prepared on a very large scale by Mr. Bosisto, of Melbourne, and now form an important article of commerce with this country and elsewhere. Mr. Bosisto alone produces about 1000 lbs. of *Eucalyptus* oils per month. These oils generally have a somewhat camphoraceous smell; but the odour differs in the various species, and the oil obtained from *E. citriodora* has a pleasant citron-like odour.

Some of these oils have been employed, as *Eucalyptus oleosa*, as a solvent for resins in the preparation of varnishes; but they are of far more value for diluting the more delicate essential oils used in perfumery. They have been especially recommended for this and other purposes in this country by Mr. Rimmel; and specimens of soaps and other substances thus scented have been kindly sent by him for illustrations at the present lecture. The oils of *E. amygdalina*, *E. globulus*, and *E. citriodora* are thus more especially employed.

The oil chiefly consists of a substance called by its discoverer, M. Cloez (who made some interesting researches on the essential oil of *E. globulus*), eucalyptol, a liquid body, in chemical characters resembling campher.

Most of these *Eucalyptus* oils are of a yellowish colour, although some have a bluish tint; by redistillation the oil may be obtained nearly colourless, as in the specimen now exhibited from Messrs. Savory and Moore, of Bond Street.

From the quantity of oil contained in the leaves, they yield, when burned, a very large proportion of gas; and it is said that one of the towns in the gold-regions was for a long time lighted by gas extracted from this source.

The gas thus obtained is stated to produce a very brilliant flame ; and as much as 10,000 cubic feet have been obtained from one ton of leaves. But the expense of collecting these leaves in a country where labour is so costly appears to have proved a barrier to its employment except under exceptional circumstances.

We have now, in conclusion, to allude very briefly to the medicinal properties of the *Eucalyptus globulus*. As already noticed, the febrifugal properties of the bark and leaves of this plant have been testified to by many practitioners—as M. Pepin, Dr. Carlotti, Dr. Lorinser, Professor Gubler, Dr. Keller, Dr. Maclean, and more especially of late years by Dr. Gimbert, who has published two important communications upon the subject. It is said to be a valuable remedy, and more especially in intermittent fevers and bronchitis. For several elegant preparations of the leaves and bark, such as the tincture, fluid extract, syrup, extract, lozenges, and pills, I am indebted to the kindness of Messrs. Savory and Moore, who have made these preparations a special object of study.

Probably some of the exaggerated statements that have been made in reference to the efficacy of *Eucalyptus* bark and leaves in fevers have arisen under the mistaken idea that the bark contained an alkaloid resembling, if not identical with, quinine, the well-known alkaloid of Cinchona-barks. But the experiments of Mr. Broughton, the government chemist of Ootacamund, entirely disprove this ; for upon careful examination of the bark and leaves, Mr. Broughton states that neither quinine nor the other alkaloids of Cinchona-bark, as quinidine, cinchonine, or cinchonidine, exist in the plant in any proportion. What properties the plant possesses would appear, therefore, so far as known at present, to be due essentially to the presence of eucalyptol, already noticed as the principal constituent of *Eucalyptus* oil.

From the testimony of numerous medical practitioners in various parts of the world where the plant has been introduced, and from its popular reputation in fevers in Australia and other countries, we can scarcely doubt that it does possess anti-periodic properties, although these are far less important than those of Cinchona-bark.

In making preparations of *Eucalyptus* leaves the narrow leaves should alone be used, as recent investigations by a German physician, Dr. Hermann Effinger, have shown that these are far more efficacious than the broader leaves found on the younger and faster-growing herbaceous shoots.

Dr. Gimbert has also recently introduced a new method of dressing

wounds by using *Eucalyptus* leaves instead of lint. The leaves are simply laid on the wounds; and it is said that their balsamic nature not only cures, but removes all the unpleasant odour.

Another way of using *Eucalyptus* leaves is in the form of cigarettes. Some of these, made by Messrs. Savory and Moore, and others prepared by Mr. Bosisto, of Melbourne, who originally exhibited them at the Paris Exposition, are now on the table. These cigarettes are reputed to be efficacious in bronchial and asthmatic affections and in other ways.

We have now taken a general view of the characters, properties, and uses of the various species of *Eucalyptus*, and more especially of *Eucalyptus globulus*; and we cannot but conclude that, allowing for exaggeration, when we regard the beauty of the different species, the proved influence of *Eucalyptus globulus*, and probably other species, in improving the pestilential character of marshy districts, and the numerous valuable economic and medicinal products derived from them, the genus is one of the most important to man in the vegetable kingdom.



